



US006580820B1

(12) **United States Patent**
Fan(10) **Patent No.: US 6,580,820 B1**
(45) **Date of Patent: Jun. 17, 2003**(54) **DIGITAL IMAGING METHOD AND
APPARATUS FOR DETECTION OF
DOCUMENT SECURITY MARKS**(75) Inventor: **Zhigang Fan**, Webster, NY (US)(73) Assignee: **Xerox Corporation**, Stamford, CT
(US)(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.(21) Appl. No.: **09/328,481**(22) Filed: **Jun. 9, 1999**(51) **Int. Cl.⁷** **G06K 9/00**; G03G 21/04(52) **U.S. Cl.** **382/135**; 399/366(58) **Field of Search** 382/135, 137,
382/138, 101, 216, 184, 218-221, 286;
283/72, 114, 902; 399/366; 386/94; 705/57,
58(56) **References Cited****U.S. PATENT DOCUMENTS**

4,482,971 A	*	11/1984	Blazek	382/135
5,067,162 A	*	11/1991	Driscoll et al.	382/126
5,216,724 A	*	6/1993	Suzuki et al.	382/135
5,781,653 A		7/1998	Okubo	
6,011,866 A	*	1/2000	Donelly et al.	382/135
6,067,374 A	*	5/2000	Fan et al.	382/135
6,091,844 A	*	7/2000	Fujii et al.	382/135
6,115,494 A	*	9/2000	Sonoda et al.	382/135
6,167,147 A	*	12/2000	Mowry, Jr. et al.	382/135

6,272,245 B1	*	8/2001	Lin	382/135
6,289,125 B1	*	9/2001	Katoh et al.	382/135
6,351,550 B1	*	2/2002	Inaoka et al.	382/100
6,393,140 B1	*	5/2002	Itako	382/135
6,470,096 B2	*	10/2002	Davies et al.	382/203

FOREIGN PATENT DOCUMENTS

EP	0 608 188 A2	7/1994
EP	0 664 642 A2	7/1995
EP	0 675 631 A2	10/1995
EP	0 751 475 A2	1/1997
EP	0 789 270 A1	8/1997

* cited by examiner

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Minnich & McKee, LLP(57) **ABSTRACT**

A method and apparatus for preventing or inhibiting effective reproduction of documents such as currency, checks, stock certificates, and any other printed document including a pre-defined security mark printed therein. The subject method and apparatus operate to effect a multi-step review of all digital image data acquired from a printed document to be reproduced for purposes of locating any potential security marks and further examining same for purposes of positively identifying a potential security mark as an actual security mark. If a mark is located and verified to be an authentic security mark, effective reproduction of the printed document will not be permitted and/or other security measures will be taken.

6 Claims, 11 Drawing Sheets